

**STANDARDS OF THE
TUBULAR EXCHANGER
MANUFACTURERS ASSOCIATION**



TENTH EDITION

TUBULAR EXCHANGER MANUFACTURERS ASSOCIATION, INC.
Richard C. Byrne, Secretary
www.tema.org

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PREFACE

Tenth Edition – 2019

The Tenth Edition of the TEMA Standards was prepared by the Technical Committee of the Tubular Exchanger Manufacturers Association. In addition to updated graphics and charts with a modernized appearance, numerical analysis of flexible shell elements, comprehensive rules for the design of horizontal saddle supports, dimensional data for various standard flanges, guidelines for distributor belts, and a fouling mitigation design study have been added.

The Editor acknowledges with appreciation the contributions by Tony Paulin and Fred Hendrix at Paulin Research Group (PRG) for assistance with the Flexible Shell Element numerical analysis, and the Heat Transfer Research Institute (HTRI) for their guidance on distributor belts and with fouling mitigation.

The Editor also acknowledges with appreciation the many years of service and contributions by Jim Harrison to the TEMA Technical Committee.

Daniel Gaddis, Editor

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NOTES TO USERS OF THE TEMA STANDARDS

Three classes of Mechanical Standards, R, C, and B, reflecting acceptable designs for various service applications, are presented. The user should refer to the definition of each class and choose the one that best fits the specific need.

Corresponding subject matter in the three classes of Mechanical Standards is covered by paragraphs identically numbered except for the class prefix letter. Paragraph numbers preceded by RCB indicates that all three classes are identical. Any reference to a specific paragraph must be preceded by the class designation.

The Recommended Good Practice section has been prepared to assist the designer in areas outside the scope of the basic Standards. Paragraphs in the Standards having additional information in the RGP section are marked with an asterisk (*). The reference paragraph in the RGP section has the identical paragraph number, but with an "RGP" prefix.

It is the intention of the Tubular Exchanger Manufacturers Association that this edition of its Standards may be used beginning with the date of issuance, and that its requirements supersede those of the previous edition six months from such date of issuance, except for heat exchangers contracted for prior to the end of the six month period. For this purpose, the date of issuance is April 8, 2019.

Questions by registered users on interpretation of the TEMA Standards should be submitted online at www.tema.org. Questions requiring development of new or revised technical information will only be answered through an addendum or a new edition of the Standards.

Upon agreement between purchaser and fabricator, exceptions to TEMA requirements are acceptable. An exchanger may still be considered as meeting TEMA requirements as long as the exception is documented.

N-1 SIZE NUMBERING AND TYPE DESIGNATION - RECOMMENDED PRACTICE

It is recommended that heat exchanger size and type be designated by numbers and letters as described below.

N-1.1 SIZE

Sizes of shells (and tube bundles) shall be designated by numbers describing shell (and tube bundle) diameters and tube lengths, as follows:

N-1.1.1 NOMINAL DIAMETER

The nominal diameter shall be the inside diameter of the shell in inches (mm), rounded to the nearest integer. For kettle reboilers the nominal diameter shall be the port diameter followed by the shell diameter, each rounded to the nearest integer.

N-1.1.2 NOMINAL LENGTH

The nominal length shall be the tube length in inches (mm). Tube length for straight tubes shall be taken as the actual overall length. For U-tubes the length shall be taken as the approximate straight length from end of tube to bend tangent.

N-1.2 TYPE

Type designation for complete assemblies shall be by letters describing front end stationary head types, shell types, and rear end head types, in that order, as indicated in Figure N-1.2. Type designations shall be used as applicable for partial heat exchanger assemblies.

N-1.3 TYPICAL EXAMPLES**N-1.3.1**

Split-ring floating head exchanger with removable channel and cover, single pass shell, 23 1/4" (591 mm) inside diameter with tubes 16' (4877 mm) long. SIZE 23-192 (591-4877) TYPE AES.

N-1.3.2

U-tube exchanger with bonnet type stationary head, split flow shell, 19" (483 mm) inside diameter with tubes 7' (2134 mm) straight length. SIZE 19-84 (483-2134) TYPE BGU.

N-1.3.3

Pull-through floating head kettle type reboiler having stationary head integral with tubesheet, 23" (584 mm) port diameter and 37" (940 mm) inside shell diameter with tubes 16' (4877 mm) long. SIZE 23/37-192 (584/940 -4877) TYPE CKT.

N-1.3.4

Fixed tubesheet exchanger with removable channel and cover, bonnet type rear head, two pass shell, 33 1/8" (841 mm) inside diameter with tubes 8' (2438 mm) long. SIZE 33-96 (841-2438) TYPE AFM.

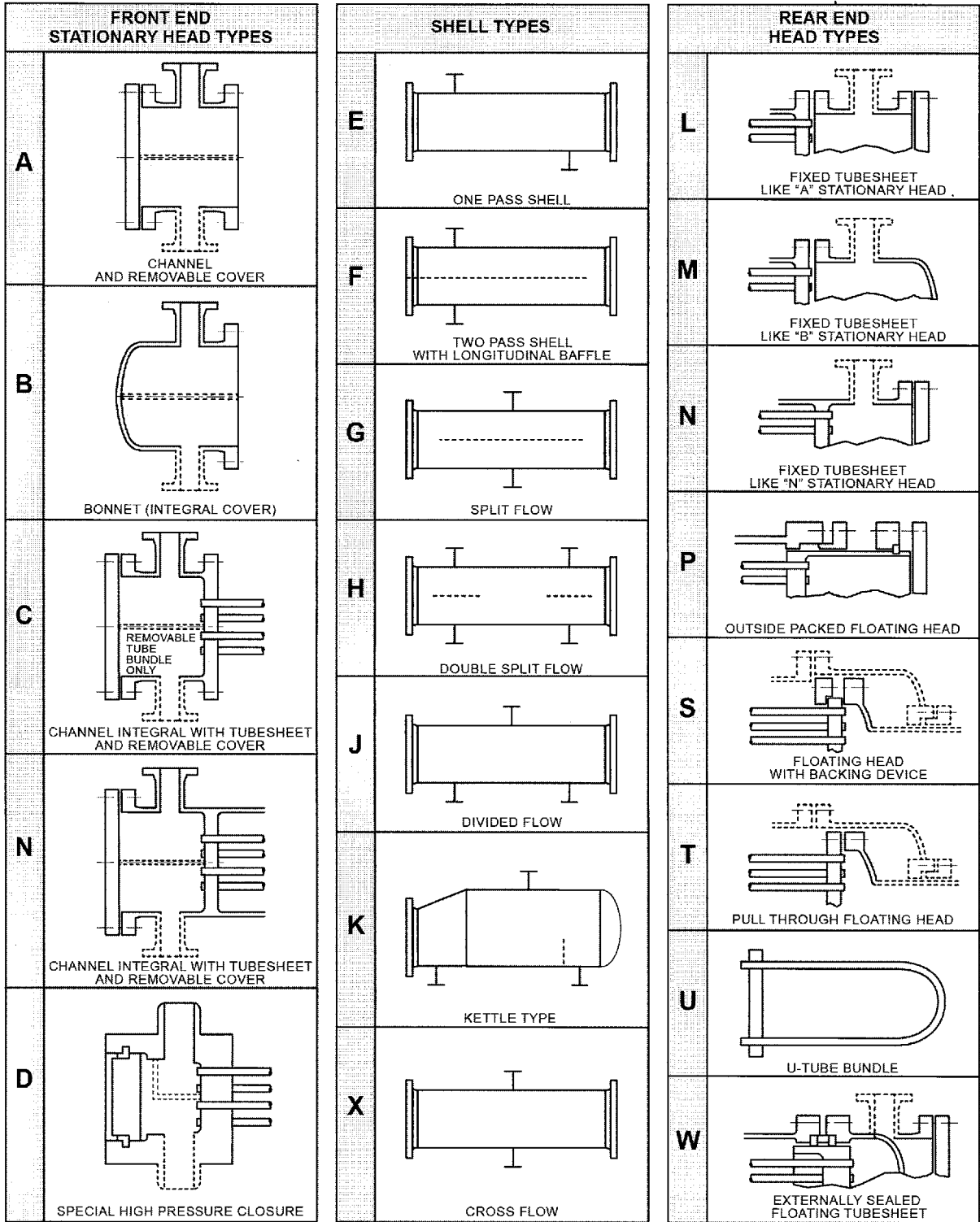
N-1.3.5

Fixed tubesheet exchanger having stationary and rear heads integral with tubesheets, single pass shell, 17" (432 mm) inside diameter with tubes 16' (4877 mm) long. SIZE 17-192 (432-4877) TYPE NEN.

N-1.4 SPECIAL DESIGNS

Special designs are not covered and may be described as best suits the manufacturer. For example, a single tube pass, fixed tubesheet exchanger with conical heads may be described as "TYPE BEM with Conical Heads". A pull-through floating head exchanger with an integral shell cover may be described as "TYPE AET with Integral Shell Cover".

FIGURE N-1.2



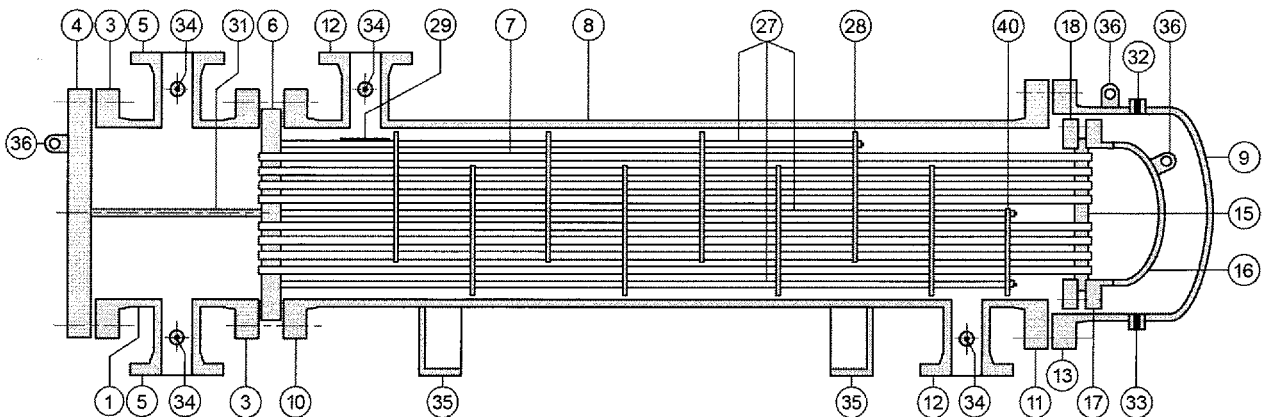
N-2 NOMENCLATURE OF HEAT EXCHANGER COMPONENTS

For the purpose of establishing standard terminology, Figure N-2 illustrates various types of heat exchangers. Typical parts and connections, for illustrative purposes only, are numbered for identification in Table N-2.

TABLE N-2

- | | |
|---|--|
| 1. Stationary Head-Channel | 21. Floating Head Cover-External |
| 2. Stationary Head-Bonnet | 22. Floating Tubesheet Skirt |
| 3. Stationary Head Flange-Channel or Bonnet | 23. Packing Box |
| 4. Channel Cover | 24. Packing |
| 5. Stationary Head Nozzle | 25. Packing Gland |
| 6. Stationary Tubesheet | 26. Lantern Ring |
| 7. Tubes | 27. Tierods and Spacers |
| 8. Shell | 28. Transverse Baffles or Support Plates |
| 9. Shell Cover | 29. Impingement Plate |
| 10. Shell Flange-Stationary Head End | 30. Longitudinal Baffle |
| 11. Shell Flange-Rear Head End | 31. Pass Partition |
| 12. Shell Nozzle | 32. Vent Connection |
| 13. Shell Cover Flange | 33. Drain Connection |
| 14. Expansion Joint | 34. Instrument Connection |
| 15. Floating Tubesheet | 35. Support Saddle |
| 16. Floating Head Cover | 36. Lifting Lug |
| 17. Floating Head Cover Flange | 37. Support Bracket |
| 18. Floating Head Backing Device | 38. Weir |
| 19. Split Shear Ring | 39. Liquid Level Connection |
| 20. Slip-on Backing Flange | 40. Floating Head Support |

FIGURE N-2



AES